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ABSTRACT

In this paper, the authors examine several factors related to class size. The purpose of the presentation is to: (1) trace the evolution of class-size research; (2) briefly describe the Student Achievement Ratio (STAR) class-size experiment; (3) summarize the early and the later student outcomes of STAR participants; (4) outline the research-demonstrated and theory-based reasons for the obtained student and teacher outcomes using STAR data and inferences drawn from many STAR-generated class-size studies; (5) show how these results seriously question the direction of U.S. education since 1965; (6) explain policy and practice steps required to reverse some negative trends; and (7) offer guidelines to implement small classes, K-3, as a foundation for education improvement at little cost. Appendixes include a reprint of a Los Angeles Times article dealing with crowded Orange County schools, and basic design issues of a longitudinal class-size experiment. Results suggest that the closer a study adhered to controlled, experimental research (for example, STAR), the more pervasive and enduring were early outcomes that benefited all students, but especially favored minority, poor, male students. Research shows the necessity of 3 or 4 years of small-class "treatment." Teacher aides added no consistent benefit, but volunteers used under a teacher's direction enrich outcomes. (Contains 55 references.) (DFR)

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MAKING SENSE OF CONTINUING AND RENEWED CLASS-SIZE FINDINGS AND INTEREST [1]

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Making Sense of Continuing and Renewed Class-Size Findings and Interest

ABSTRACT

Interest in class size as a variable in education has grown mighty from 1980 (after the Glass and Smith meta-analyses) until now. Major steps include Indiana's Prime Time (1981); Texas H.B. 72 (1984); Tennessee's 1984 initiation of STAR (Student Teacher Achievement Ratio) and related class-size studies that still provide new data and outcomes; California's massive Class-Size Reduction (CSR), and class-size legislation/projects in many states and districts. It's time for "sense making" syntheses.

Purpose

This presentation a) Traces the evolution of class-size research;. b) Briefly describes the Student Teacher Achievement Ratio (STAR) class-size experiment; c) Summarizes results of the early (1985-1989, grades K-3) and the later (1990-2002, grades 4-12 and beyond) student outcomes of STAR participants, d) Outlines the research-demonstrated and theory-based reasons for the obtained student and teacher outcomes using STAR data and inferences drawn from many STAR-generated class-size studies (1990-2002); e) Shows how these results seriously question the direction of U.S. education from 1965 (PL 89-10, ESEA) to 2002; f) Explains policy and practice steps required to reverse some negative trends, and g) Offers guidelines to implement small classes, K-3, as a foundation for education improvement at little cost. This last step will require serious critique and probably rejection of many popular, commonly accepted, but not research supported education practices.

Method

The authors analyzed outcomes from class-size initiatives that had enough longevity so results could logically be ascribed to the treatment. Studies were assessed for quality not only for outcomes, but also for fidelity of class-size treatment (Not Pupil-Teacher Ratio or PTR).

Study processes/outcomes were compared with the relevant theory and research. For studies with sufficient history, results were reviewed for sustainability and generalizability, that is, for evidence that outcomes extended beyond the treatment time and across more than a single measure thus suggesting the appropriateness of class-size policy.

Results

The closer a study adhered to controlled, experimental research (e.g., STAR), the more pervasive and enduring were early outcomes that benefited all students, but especially favored minority, poor, male students. Research shows the necessity of 3 (preferably 4) years of small-class "treatment." Teacher aides (paid/full or part-time) added no consistent benefit, but volunteers used under a teacher's direction enriched outcomes. Positive results included teacher time with each student, high parent involvement, a minimum of "pull-out" disturbances, little time off task, reduced retention in grade, improved teacher efficacy and morale.

Results call into question the proliferation, since ESEA (1965) of projects (Where have so many projects gone, anyway? Remember ITIP, career ladders, programmed instruction, instructional TV, etc.?), of use of teacher aides, etc. in favor of small, coherent learning units for small children (K-3). Small classes help teachers respond to rising child poverty, increasing diversity, requirements for inclusion, etc. Small classes K-3) should be a foundation for U. S. education policy, but ideology, politics, and the general resistance to changes serve to impede widespread class-size reductions and appropriate use.

MAKING SENSE OF CONTINUING AND RENEWED CLASS-SIZE FINDINGS AND INTEREST [2]

Introduction

There is continuing interest about the effects of class size on student outcomes, especially when legislators and others are calling for increased "accountability" while concurrently shrinking or redirecting support for public education and/or seeking alternatives to public education. In the new emphasis on education proclaimed by the President, with its reliance on "solid science," the education cadre at the U. S. Department of Education (USDOE) first tried to expunge the class-size initiative of the former administration, and then blended it into another package while removing attention from it. So much for "solid science." [To put this into perspective, note the large-scale, thorough academic critiques of the work of the National Reading Panel (NRP) and of some Whole-School Reform Programs (such as Success For All or SFA) that the new Administration touts as "solid science." That could be another paper!]

There have been critiques and criticisms of class-size research, if only because the research has been around for a long time—so long, in fact, that in 1986 Mosteller, Light and Sachs wrote in the Harvard Educational Review, 66 (4) about "Sustained Inquiry in Education: Lessons From Skill Grouping and Class Size." With a long and sustained line of inquiry (since just before 1900 in the U.S.), educators and policy makers should certainly have learned much about class size. Ah, it would seem so. But an old German proverb warns that "An old error is always more popular than a new truth," a sentiment echoed in a U. S. Today item, "Falsehoods Linger Longer Than Truth" (12/11/00, p. 5D).

One major hurdle that keeps people from understanding "class-size" findings is definition. Clear, correct, compelling, and concise definition is, a first step in understanding something. The definition of class size (CS) might seem straight-forward and simple: The

number of students in a class for whom the designated teacher is responsible and accountable is the definition of CS used in this paper. The "definition of terms" section of reputable research helps keep meaning clear and precise, and is an important and integral part of most respected research.

Reisert (1971) who authored the section on "class size" in the Encyclopedia of Education said: "Class size and pupil-teacher ratio. Although the two closely related but distinctly different concepts of class size and pupil-teacher ratio (PTR) may seem to be synonymous at first glance . . ." (p. 157, Emphasis added). In the Digest of Education Statistics (e.g., 1999), the National Center on Education Statistics (NCES) provides separate definitions for class size ("The membership of a class at a given date") and for pupil-teacher ratio ("The enrollment of pupils at a given time divided by the full-time equivalent number of . . ."). Data are the presented in separate tables (e.g., Table 65 ". . . pupil/teacher ratio . . ." and Table 69 ". . . and average class size . . ." (pages 75 and 79 respectively). The numbers for the corresponding years are different because the concepts are different. Simply put, class size is an addition problem and PTR is a division problem.

In his guide on Educational Policy Systems, Iannaccone (1975) emphasized one issue at the forefront of PTR and CS confusion: "Descriptive reference is the first and most essential sense in which a concept has meaning" (p. 13 Emphasis added).

> . . . the clarity of the meaning of a concept turns on the precision of the relationship between the concept and its referent, the features of the world for which it is a label. One source of error in the scientific venture is lack of precision in the referent of the concepts. Lack of precision leads to lack of reliability in the concepts. (pp. 13-14).

Hanushek (1998), an economist who often speaks on "class size," addressed the same issue that the "conceptual ideal behind any measurement" is important. He made two key points: 1) ". . . pupil-teacher ratios are not the same as class sizes," and 2) "The only data that are

available over time reflect the pupil-teacher ratios" (p. 12). Incredibly, however, Hanushek then discusses class size by using PTR data. Partly because of this inattention to definition, Biddle and Berliner (2002) said "Because of these responses and activities, it is no longer possible to give credence to Hanushek's judgements about class size" (p. 15).

Lack of precision in statistical, descriptive, and qualitative analyses, in publishing class-size discussions and the results of research is at the heart of confusion about CS research and the use of those research results. (Appendix A discusses PTR-CS confusion). The PTR is an administrative procedure for allocation of resources. Class size is an organizing framework for the delivery of instruction. Fiscal officers, budget directors, and economists are interested in PTR; teachers, instructional leaders, students and parents focus on class size. Where are studies to show that bigger classes are better? Or, that small classes don't work? OR, that they are expensive?

The Force of Sustained Inquiry

A field of knowledge advances when researchers add to it over time by exploring related questions using diverse approaches. The current knowledge about class-size influences and processes builds upon class-size research that might be considered "groundbreaking" studies (1900-1965 or so), evaluations (1966-1979), and "refining studies" (1979-present). Early studies emphasized "common sense" and showed advantages of smaller groupings of children for schooling. The studies were generally brief, conducted using whatever grade levels of classes might be available, methodologically unsophisticated, and employed rudimentary analysis procedures. The "refining" studies, both methodological and "heuristic," extended and improved earlier studies in several ways: Scope, duration, method, description, explanation, continuity, etc. The early phase (1965-1979 or so) logically involved evaluations of "special" efforts, such

as Title I, and a host of projects. Results often were reported as CS when the studies were PTR rather than CS, at least at elementary levels. Large-scale observation studies (e.g., Lindbloom, 1970, Olson, 1971) provided insights into the operations and processes occurring in small classes.

Among others, Slavin (1990) summarized and critiqued early class-size studies. The early phase concluded with the deservedly acclaimed meta-analyses of Glass and Smith (1978, 1979) and Smith and Glass (1979) that were part of the class-size program at the Far-West Education Laboratory which included work by Cahen and Filby (1979); Filby et al., (1980) and Glass, Cahen, Smith and Filby (1982).

Project Prime Time (1981) was a large-scale, statewide demonstration of class-size in early grades. To expand the study to grades K and 3, educators could use teaching assistants or aides as part of the "class-size" treatment. Although Prime Time was a project (demonstration) it was evaluated (e.g., Chase, Mueller & Walden, 1986) and still (2002) is providing researchers with material. (E.g., Lapsley & Dayter, 2001)

In 1984, leaders in Texas enacted House Bill (HB) 72 that contained class-size (and PTR) provisions for grades K-2, as well as publicly-funded pre-K, extended-day, etc. Small classes were extended to grades K-4 in later amendments. HB 72 restricted the range of CS, grades K-4. Researchers who claim that CS in Texas was <u>not</u> important should explain how they can do that when classes had little variance (they were more like constants than variables).

In 1984 Legislators in Tennessee enacted HB 544 that initiated Project STAR (Student-Teacher Achievement Ratio). Project STAR was not a project, but an <u>experiment</u> to determine the effect of small classes (13-17 students) on the achievement and development of primary students (grades K-3). The STAR consortium of five principal investigators or PIs (Achilles,

Bain, Folger, Johnston) and Bellott (1985-86) representing major universities in Tennessee, as well as consultants (e.g., Finn), advisory groups, and administrative direction from the Tennessee State Department of Education established and operated STAR (1985-1989) and produced a Final Report (Word et al., 1990).

STAR spawned studies and evaluations such as the Lasting Benefits Study, Challenge, re-analyses of STAR data, studies of "enduring effects" of early small-class engagement, teacher aide effects, etc. STAR results, besides attracting critics and critiques, generated renewed interest in CS work and implementation, leading to statewide efforts (e.g., SAGE in WI, Class-Size Reduction or CSR in CA) and class-size legislation at state (e.g., CA, WI, UT, NY, IL, NC, GA, OK, NV, FL) and national levels.

Three tables summarize ideas related to the new class-size interest. Table 1 reviews some CS studies, research reviews, and critiques (1979-2001). Tables 2 and 3 show CS outcomes from studies. Appendix B is a brief description of Project STAR.

TABLES 1-3 ABOUT HERE

A View of Some Small-Class Outcomes (Longer Than Three Years).

Information presented here is excerpted from some long-term CS studies. To the extent possible, these are CS studies and not results of PTR efforts.

The Fairfax County Public Schools (FCPS) Virginia CS Evaluation began with a small-class pilot and planning in 1991 and implementation in 15 schools in fall, 1992. By 1996-97, 48 schools were participating. Small classes began in grade 1, in schools with many low-SES pupils. Executive summary (ES) highlights are(FCPS, 1997):

> The supporting data indicated strong evidence that the Reduced-Ratio Program is more effective for students from low (SES) backgrounds. There is also evidence

> that ideal program implementation is an important factor in increasing student achievement ... (ES-5, Emphasis Added).
>
> Consider extending the program beyond first grade in the most needy schools . . . FCPS students from low (SES) backgrounds and students in schools with ideal implementation showed some significant gains on a nationally norm-referenced test three years after participating in the program. (ES-5, Emphasis Added).

Differences are apparent in test-score results (1993-94 to 1995-96) on Grade 4 ITBS scores between 10 schools with "ideal" and 19 schools with less-than ideal implementation. Students in ideal-implementation schools provided significant and positive ITBS gains on 6 of 8 subtests (the other two had positive but non-significant gains). In the other 19 schools there were no gains on 6 of 8, a positive gain on one, and a loss on one. Table ES-3 from the FCPS study is reproduced below as Table 4 (p. ES-4).

Table 4.

Table ES-3
Average Scale Score Change on 1995-1996 Grade 4 ITBS
When Compared to 1993-1994 Scores

ITBS Subtest	10 Schools with Ideal Implementation	19* Schools with Variations in Implementation
Reading Comprehension	+3**	0
Vocabulary	+2	-1
Total Language	+4**	0
Math Concepts	+5**	+1
Math Problem Solving	+2	0
Math Computation	+2**	0
Total Math	+3**	0
Composite	+3 **	0

* Two schools were excluded because they had no fourth grade. ** Significant $p < .05$

This FCPS information supports the STAR finding that there are right (ideal) ways to implement class-size changes in a school or school system to get positive student gains. Detailed

and research-based guidelines on how to implement small classes have been described elsewhere [e g., Achilles & Finn (2000, March)]. Key points are: 1) Early Intervention, 2) Intense—all day, each day, 3) Sufficient Duration, and other factors.

The Burke County, North Carolina, Class-Size Reduction (CSR) Effort. Burke County is a low-wealth western NC system in the foothills of the Great Smoky Mountains. As it has grown, the school system has experienced an influx of Limited English proficient (LEP), English as a Second Language (ESL), and low SES youngsters.

To counter declining student test scores, Burke County Schools (BCS) officials initiated CSR in grade one at four schools (1991-92). Results were good. In 1992-93 small classes (about 15:1) were in grade one of 14 schools and in grade two at the four pilot schools. By 1995-96 CSR was in grades 1-3 at all 18 elementary schools. This small-class phase-in was done with available funds by creative reallocations and re-assignments in a low-wealth district. (Stewart, 1998: Achilles, Egelson, & Harmon 1995). (See Table 5).

Table 5. Student Demographic Changes, Burke County, NC 1992-93 to 1997-98: Population, Limited English Proficiency (LEP), Free Lunch (FL) and Title I Eligible.

	Population		Growth (92-01)	
	1992-93 n	2000-01 n	n	%
(A) Population	12,400	14,356	1956	16
(B) Free Lunch	3583	5451	1868	52
% B/A	29	38	—	—
(C) Limited English Proficient (LEP)	217	1300 (EST)*	1483	683
% C/A	2	9	—	—

* Est. from Harrington-Lueker, D. (2002, January) Reading reform. The School Administrator, 59 (1), 6-11. p. 9. [Listed at 1700 or 8% (sic), 1300 is closer].

Most BCS students who started in grade one in 1992 and all who started in 1993-94 could have been in small classes, grades 1, 2, and 3. Test results are from North Carolina's end-of-grade (EOG) tests. Students scoring in levels 3 or 4, the top two levels are "proficient." Level 1, the lowest, are students who most need growth. A goal is to reduce the percentage of students scoring in level 1 and to increase the percentage of students scoring proficient, levels 3 and 4. By 1994-95 about half of grade-3 students had small-classes in grades 1-3. By 1995-96 all BCS students could have had small classes in grades 1-3 before they took the Grade-3 EOG tests. Table 6 shows both the decline in level 1 and the increase in levels 3 and 4 (proficient) in the EOG tests, 1992-93 to 2000-01, a direct link to the small-class effort. The 1998 through 2001 results show that the test-score increase was maintained despite the 16% increase in population, 52% increase in free lunch, 683% increase in LEP, and a large increase in Title-I students served. Grades K-5 in BCS (2001) are about 14-1.

Table 6. Burke County, NC EOG Test Outcomes. Grade 3 (Stewart, 1998 & updated)*

YEAR that (MOST) or ALL students taking EOG Test could have had grades 1-3 in small classes.	Level 1 % Not Proficient		Levels 3 & 4 % Proficient	
	Reading	Math	Reading	Math
1993	13.4	10.9	60.3	61.6
1995 (MOST)	8.6	5.6	68.6	71.4
1996 ALL	5.9	4.7	74.0	75.9
1998 ALL	4.4	2.4	79.8	76.0
1999 ALL	4.0	2.9	78.1	75.7
2000 ALL	2.4	2.1	83.9	80.5
2001 ALL	3.4	0.2	81.3	89.1

* Thanks to Burke County personnel for compiling and sharing these results: Former superintendent T. Stewart, and present personnel D. M^{c}Gee, K. Schwengel, S. Wilson, T. Farris, and M. Church.

Initial Indicators of Class-Size Successes from Texas Data. In 1984 Texas passed HB 72 which mandated small classes, not to exceed 22 students in grades K-2 in all Texas schools by 1985-86, and in grades K-4 by 1988-89. A Texas student who began school in 1985 could have experienced small classes in grades K-4, and even in pre-K. Academic progress in Texas is measured several ways, including the Texas Assessment of Academic Skills (TAAS). The first year that grade-10 students who could have had small classes in grades K-4 took the TAAS was 1995-96. If full implementation of small classes was slow, the small-class effect would show up in later years of testing (1997-98, 1998-99, 1999-00) and should level off about 2001-2002 unless there is an increase in pre-K or after-school interventions, or for other reasons such as those identified in the analyses by Haney (2000) that show large increases in grade retention, dropouts, and special education exemptions, especially for minority students in the years before and after the high-stakes, grade-10 TAAS.

Table 7 compares the percent of groups of grade-10 students passing the TAAS: White, Hispanic, African-American, Economically Disadvantaged, and All, from 1993-94 through 1999-00. Data show a differential impact. Minority and economically disadvantaged students get larger gains than do white students. The largest gains occur after sophomores could have had at least two years in a small class (1996-97). Basic skills as measured by TAAS scores seem to have gone up for all students, but especially for Hispanic, African-American and Economically Disadvantaged students.*

* Data are not clear if economically disadvantaged students are a duplicated count including Hispanic and African-American students.

Table 7. Percent of Groups of Grade-10 Students Passing All Three Parts of TAAS by Years. (Adapted from Cortez, 1999, pp. 6-7).

	Percent Passing by Groups. ( ) = Difference from White (by years).					
Test YEAR	ALL	WHITE	HISP*	AF. AM. *	ECO. DIS. *	Possible Years (n) in Small Class (K-4) **
93-94	50	64	34 (30)	28 (36)	32 (32)	0
94-95	52	67	36 (31)	31 (36)	34 (33)	0
95-96	57	71	43 (28)	37 (34)	40 (31)	1
96-97	64	78	49 (29)	46 (32)	47 (31)	2
97-98	69	81	57 (24)	52 (29)	54 (27)	3
98-99	75	86	64 (22)	60 (26)	62 (24)	4
99-00	80	89	70 (19)	67 (22)	68 (21)	5
GAIN	30	25	36 (11)	39 (14)	36 (11)	
Diff from ALL		-5	+6	+9	+6	

* Hisp = Hispanic; AF. AM. = African American; ECO. DIS. = Economically Disadvantaged

** NOTE. In 1993-94 grade-10 students would have had no years of HB 72 small classes. STAR analyses showed that 3 or more years in a small class had lasting benefits.

The Uncertainty Principle in CSR in California.

Thus far, one major "class-size" study has been omitted. California's massive Class-Size Reduction (CSR) initiated in 1996 was omitted not because it is unimportant (It is very important), but because there is no reliable way to determine if the CSR was actually small classes, or primarily a PTR event. The good news from CA's CSR program are positive, although small student gains. The bad news is that test-score gains (to date) have been small. Results have not followed the general pattern in closely controlled CSR efforts such as STAR and SAGE of showing greater benefits for poor male and minority youth than for others. There

is no evidence yet of long-term outcomes, reduced retention-in-grade, etc. Some unanticipated changes seem not to favor the youth for whom the CSR should have most benefit. Seemingly negative outcomes include the increase of non-certified teachers, especially in schools with high incidences of low performing and minority children (Stecher et al., 2001; Bohrnstedt, 2000).

An Attempt at "Sense Making"

Some authors of recent CS analyses and critiques have suggested that CS may not be the reason for the advantages found in the CS studies. They argue that researchers still need to find out why CS changes influence student outcomes. Stecher et al., (2001) offer an example of the point: "While there is a strong perception (sic) that more learning goes on in smaller classrooms (sic), little is known about why smaller classes might be better learning environments" (p. 674). [An aside for an editorial note is appropriate. Research such as STAR—a controlled, longitudinal experiment is about cause and effect, not about perceptions. STAR was not a facility study about classrooms, but research about the class, the organization unit for instruction within a classroom and school] STAR researchers have explained why small classes produce improved outcomes and published those results.

SAGE (Student Achievement Guarantee in Education), a K-3 class-size effort in Wisconsin has expanded each year. Evaluation results roughly mirror the annual outcomes from STAR (Molnar et al., 1999, 2000). SAGE quantitative outcomes have consistently been supported by qualitative and explanatory analyses to help explain why and how small classes contribute to student achievement.

Because of its longevity (1985-present), size (over 11,600 students), and research design (longitudinal, randomized experiment), STAR contributed much to class-size work. Not only did STAR researchers examine quantitative results such as test scores, and retention, etc., but

they interviewed STAR teachers and aides, collected data from questionnaires on teaching processes (etc.) to provide evidence of how and why small K-3 classes are so closely associated with improved student outcomes in grades K-3 and beyond. (See Tables 2 and 3 and Appendix B). Using the original STAR database, researchers followed many K-3 STAR participants into the upper grades to monitor later behavior and outcomes (e.g., Boyd-Zaharias & Pate-Bain, 2000; Finn & Achilles, 1999; Finn et al., 2001), and to analyze the college-entrance test-taking results (Krueger & Whitmore, 2000).

Why and How Small Classes Work.

Concerns about why and how small classes produce improved student outcomes have been expressed in research and in policy briefs. In this section of the paper we briefly address these questions. Added details are in an author note.[3] STAR researchers addressed why and how small classes improve student outcomes in some detail. Some "reasons" offer fodder to keep serious researchers busy for years. Table 8 summarizes more than two dozen research and theory-based explanations why small classes improve student outcomes.

Table 8 About HERE

Each point in Table 8 happens automatically (e.g., space per student increases), because smaller classes allow the events to occur (e.g., more teacher time per student for such things as diagnosing learning problems, working with portfolios, correcting homework, reading with each child, etc.). Numerous studies have found that in small-class settings the teachers do not employ radically different teaching approaches or methods——unless more is different. [Achilles et al., 1994; Stecher et al., 2001; Stasz & Stecher, 2000; Filby et al, 1980; Evertson & Folger, 1989;

Evertson & Randolph, 1989; Achilles, 1999 (Esp. Chapter 5)]. Small classes let teachers use good pedagogy and accommodate context changes such as diversity, inclusion, assessment.

For example, research showing achievement and behavior benefits of student participation supports the finding of increased student participation in schools and classes as CS (and school size) decrease (Finn, 1989, 1993; Finn & Cox, 1992). Improved student performance accompanies parent involvement and/or appropriate use of homework, results that occur (automatically) with reduced classes. Reciprocity of research findings is an interesting note on validity and reliability: participation, time on task (etc.) and CS.

U. S. Education Policy Implication.

Class size information should be of great interest because CS is visible, administratively mutable, built on solid research, and does not push blame for poor performance on teachers, parents, and students. Class size is an administrative issue.

Since about 1965, bolstered by PL89-10 (The Elementary and Secondary Education Act, or ESEA) educators have increasingly used a) special projects for students with all sorts of real or imagined learning differences (even low socio-economic status [SES] backgrounds), b) teaching assistants (or aides) in classrooms, c) special teachers in early elementary grades for music/art/physical education, d) "staff development" to inform teachers of all of the special services available, etc. "Specialization" and project mentality have changed the PTR. They have fragmented the learning community of teacher and class; they have confounded accountability (who is responsible for Pat's reading—the regular or the reading teacher?). Today in America, about 45% of certified teachers actually teach a class of students all day, every day (see Figure 1, Darling-Hammond, 1998, p 11). So much for teacher shortage!

FIGURE 1 ABOUT HERE

Fragmentation in education increases with special-interest legislation and programs: for bi-lingual or ESL or LEP, for special education (especially LD or BD or EMH), for slow (or fast) learners (etc.). Each "new" effort comes with strident calls for "staff development," too. There are countervailing trends and forces to special classes: inclusion of special needs students is one example. But strong forces favor "specialization" and its concomitant, seemingly insatiable, call for staff development. Wayson, et al. (1988) identified stultifying effects of increasing specialization:

> Post-Sputnik reforms intensified the rigidities of the education system: they depersonalized the educational process; they weakened the profession by creating splits between educators; they glorified specialization by elevating teachers to positions of dominance over other teachers; they narrowed roles for teachers; and they diminished power and respect for those who work most closely with children. Rather than ameliorating problems, the post-Sputnik reforms exacerbated the endemic problems . . .. (p. 115)

Researchers have noted that the PTR in the United States has changed over the years. The elementary PTR figures from the Digest of Education Statistics (NCES, 1999, p. 75. Table 65) show that PTR in the U. S. has changed from 30.2 (1955) to 18.6 (1998). Large PTR changes followed legislation. The change from 27.6 (1965) to 24.3 (1970) followed ESEA (1965) and continued with the popular project mentality (to 20.4 in 1980). Some CS critics have claimed that special education increases have influenced CS outcomes (e.g., Hanushek, 1998, 1999) but from 1980 (giving 4 years for implementation of PL94-142) to 1997, the elementary PTR only changed from 20.4 to 18.6, and that would include responses to ADA (and IDEA) in 1990 and IDEA (1997) amendments.[4]

Of particular interest in the growing use of full-time teacher aides is the finding of no positive aide effects on student achievement, development, or behavior—as well as on a teacher's teaching. This finding has been mentioned generally in numerous studies using the

STAR data (e.g., Finn et al., 2001; Achilles, 1999; Nye et al., 2000). The aide issue was the central focus of a recent study that not only included detailed re-analyses of STAR data, but also reviewed the available teacher-aide studies (Gerber et al., 2001). The conclusion, generally, is that there are no consistent, discernable effects on student outcomes, teacher behavior, or classroom processes from the use of full-time teaching assistants.[5] Given the size and cost of the teacher aide enterprise, these findings should raise a call to action.

What **Should** Years of Class-Size Research Have Told Educators?

The sustained stream of research surrounding small classes with its positive findings combined with the general ineffectiveness of changing the PTR (e.g., Hanushek, 1998, 1999) and the less-than-glowing evaluations of Title I over the years (e.g., Abt, 1998; Borman & D'Agostino, 1996; Wong & Meyer, 1998) should have told educators to adopt a CS policy as an alternative to projects, aides, and PTR changes (except as reflected in class size). Long-term positive benefits of early CS involvement reveal the investment potential of small classes in early grades, and that implemented using the research, small classes need not be expensive. Work by Miles (1996), Achilles and Price (1999), Achilles and Sharp (1998), and others shows that small classes can be implemented by trade-offs, by re-allocations of resources, and by using the benefits of the small-class intervention. [Case studies such as in Burke County, NC (see section in this paper) show that small classes can be achieved at little or no added costs with careful trade-offs. Table 9 includes some cost/benefit issues].

TABLE 9 ABOUT HERE

Boyd-Zaharias and Pate-Bain (2000) found that compared to their peers in regular classes in K-3, small-class students were more likely to graduate from high school, receive an honors

diploma, and not drop out. Using the STAR longitudinal database Krueger and Whitmore (2001) showed benefits of small classes that last into a student's college-entrance test-taking. (We're interested now in student performance in higher education). Finn et al., (2001) and other studies using the STAR database have shown the "enduring effects" of early small classes, to the point that students with 4 years of early (K-3) small-classes treatment are nearly a full year ahead of their large-class peers at the end of grade 12; the small-class benefit is sustainable, cumulative, and long-lasting. (See also Nye et al., 2000).

What Are The Steps?

The cumulative research results are clear on using small classes for school-age youth. Simply adding teachers and doing business as usual (PTR) will not produce the small-class benefits identified in the research. Perceived expense without immediate test-score gains will encourage naysayers to repeat the refrain that class size and money don't matter in education. (Kids don't vote). As the move to implement appropriate-sized classes in America's schools escalates, educators should apply research. From years of studying and observing small classes, researchers and scholar practitioners have developed a research base, theories, and consensually validated exemplary practices of outstanding teachers to guide effective CS implementations. Informed Professional Judgement or IPJ is at the heart of CS changes.

SMALL CLASSES ARE NOT SIMPLY HIRING TEACHERS AND DOING BUSINESS AS USUAL. The correct steps are, really, quite direct and clear.

1. Early Intervention. Start when the pupil enters "schooling" in K or even pre-K.
2. Intense Treatment. The pupil spends all day, every day in the small class. Avoid Pupil-Teacher Ratio (PTR) events, such as "pull-out" projects or team teaching. Develop a sense of "community" and close student-teacher relations.
3. Sufficient Duration. Maintain the small class for at least 3, preferably 4, years for enduring effects.
4. Use Random Assignment in early grades to facilitate peer tutoring, problem-solving groups and student-to-student cooperation. (STAR).

5. Employ a Cohort Model for several years so students develop a sense of family or community. STAR results show the power of both random assignment and a cohort model. "Looping" adds teacher continuity to the cohort, and may be a useful strategy for added benefits. (Research is needed here).
6. Appropriate-sized classes in elementary grades will require policy adjustments and perhaps even legislation change.

Details of implementing small classes in the early grades are available as "A Manual For Class-Size Reductions So All Children Have Small Classes And Quality Teachers In Elementary Grades." by Achilles, C. M., Finn, J. D., Pate-Bain, H. and others (In Process). Now is the time to make sense of the years of class size research and to implement the positive results of this research to make schools better places for students and teachers. It is time to invest in education programs that actually work, and to ease away from fads. School improvement means improving the outcomes of schooling. In a quality class-size initiative students "perform" and achieve in four key areas of growth:

The ABCD's of IMPROVEMENT Will Include Positive Changes In:

ACADEMICS (E.G., TEST-SCORE PERFORMANCE ON ALL TESTS.)

BEHAVIOR/DISCIPLINE. ADJUSTMENT TO SCHOOL

CITIZENSHIP/PARTICIPATION. RELATIONSHIPS, ENGAGEMENT

DEVELOPMENT INTO PRODUCTIVE AND HUMANE ADULTS, WITH RESPONSIBILITY FOR ACTS: SELF-CONCEPT GROWTH.

Recommendations

1. Require clear definition of terms in any study of "class size."
2. Class size and PTR research are both useful. Research and evaluation on both should continue, separately. Treatments, variables, and processes in PTR and CS are not the same, so they should not be confounded and reported as the same.
3. A concerted effort should be made to educate the public, parents, policy persons, researchers, education leaders, and the media on differences between PTR and CS.

4. Educators and policy groups must advocate for the correct use of class sizes. This advocacy can be conducted by "staff development." Department of Education and other policy information on PTR and CS should use the terms explicitly.

5. Evaluators and researchers should document carefully the contexts in which students are educated so that issues of CS and PTR are evident.

6. "Ideal" implementations of CS need to be studied and evaluated, so there begins to be a substantial base of CSR data, where the event described is really CS.

Summary

The issues of "solid science' and research-demonstrated ways to "Leave No Child Behind" (M. W. Edelman), are well resolved on the topic of class size and early education of young students. The long-term benefits, need for early intervention, the process of intensity—all day, every day—with a qualified teacher whose planning and instructional time is not shattered by frequent "pull outs," and the advisability of at least four years of small-class "treatment," grades K-3, have been documented. Implementing small classes will require some trade offs, a retreat from the "project mentality" that pervades American public schooling (since 1965), re-allocation of resources and re-assignment of personnel to keep costs reasonable while improving schooling, administrative action on things that are "administratively mutable," facing up to the possibility that it is time to stop blaming teachers for education shortfalls (every present solution seems to be "staff development" for teachers), and numerous other changes that will unsettle the education and political communities. [6]

Thirty years ago Reisert (1971) distinguished between class size and PTR. It is 10 years since Glass (1992) noted that teachers would argue that "smaller classes produce more learning and provide the environment in which teachers can become more creative and not burn out so early in their careers" (p. 166). Research has shown that small classes are important, and why and how they are—as well as how to implement them. Yet, as Glass (1992) noted:

> . . . the controversy over class size has not subsided, academic quibbling about statistics aside. As usually happens, educational research may clarify a few issues, sharpen debate or shift it slightly, and replace ordinary language with numbers, graphs, and technical/scientific jargon. But it is not likely to reduce or eliminate the conflicts of interest and political positions that are played out in the school system. (p. 165)

It is time to give serious attention to what teachers, students, parents, and even administrators know and have known for years. Education policy should be built on appropriate use of class size. Administrators should lead the effort. Professors should teach it. Now.

Authors' Notes

1. Some data, tables, figures, and appendices in this paper have appeared in other materials and papers produced by the same authors, and in papers that Achilles and Finn have co-authored with others. We express our gratitude for the assistance of many colleagues in this class-size work. Among those who have contributed are the STAR staff (H. Pate-Bain, J. Boyd-Zaharias, J. Johnston, J. Folger, N. Lintz, E. Word); the Tennessee legislators, teachers, administrators, and students who gave life to STAR; other researchers who have assisted, such as S. Gerber, G. Pannozzo, P. Egelson, P. Harman; persons connected with other class-size efforts that the authors have been associated with, such as in Burke County, NC, High Point, NC, Buffalo, NY and other projects in TN.

2. C. M. Achilles, EdD, Professor of Education Leadership (50%) at Eastern Michigan University, Ypsilanti, MI and 50% at Seton Hall University, S. Orange, NJ. Achilles was one of 4 Principal Investigators of Project STAR and PI of other class-size studies. Address: 53 Snug Harbor, Geneva, NY 14456. plato9936@yahoo.com.

   J. D. Finn, PhD is Professor in the Graduate School of Education, SUNY Buffalo, NY. He was the design and analysis consultant to Project STAR, and PI of the Spencer-Foundation supported "A Study of Class Size and At-Risk Students," and PI of other class-size studies, including "The Enduring Effects of Small Classes" and "Antecedents and Consequences of High School Gateway Events," a Grant Foundation award.

3. An example of this type of question appeared in a recent issue of a research journal [Nye, B., Hedges, L. & Konstantopoulos, S. (2000, Spring). The effects of small classes on academic achievement: The Results (sic) of the Tennessee class size experiment. AERJ, 37 (1), 123-151]. "It is not yet clear how small classes lead to higher achievement. Understanding the mechanism could lead to more effective ways to implement class size reductions and to improve their effectiveness. (p. 150).

   A second example appeared in a Policy paper: Laine, S. W. M. & Ward, J. G. (eds). (2000). Using What We Know: A Review if the Research on Implementing Class-size Reduction Initiatives for State and Local Policymakers. Oak Brook, IL: NCREL. The editors, as authors of the concluding chapter raise questions and make assertions that have already been addressed in the class-size research. (pp. 85-87).

Assertion	Evidence
"class-size reduction is costly" (p. 86)	This assertion is true if CSR is initiated without attention to the research evidence, or simply by adding teachers and doing business as usual. (PTR).
"class-size reduction cannot be implemented alone" (p. 87)	It was in STAR, in Success Starts Small, in Project Challenge TN, in the DuPont Study, in Burke County, NC, and in many of the early (pioneering) studies.
"class-size reduction raises equity concerns" (p. 87).	As above, this is true only if there is no attention to using what the research has shown.

4. The authors have commented on the proliferation of projects and special teachers elsewhere. One reasonable alternative to that "project" mentality is to provide quality teachers with work loads that allow the teachers to employ their professional knowledge to plan for and teach each child in a close "learning community" where the teacher can take advantage of the context of small classes as described in Achilles (1999) and in Table 8 in this paper. Portions of the following are from Achilles, Finn and Bain (2002, In Press).

> On its surface, the idea of projects, special teachers, and teacher aides seems reasonable. Careful data analyses and observations, however, raise questions about these practices that have become commonplace since ESEA and Title I. The project mentality in education helps explain the class-size and PTR issue. (Achilles, 1999, p. 117).
>
> Ladson-Billings and Gomez (2001) reported that "Students who receive services from a variety of professionals were more likely to be confused about to whom they were responsible" (p. 677). They reported the example of a classroom teacher, reading teacher, Title I teacher and special education teacher discussing their work with one student. Each had provided the student different directives. " No wonder he looks like a deer caught in the headlights... The poor kid doesn't know which one to pay attention to" (p. 677).
>
> Hong (2001) an elementary teacher noted, "... most days broken into shards of time ... when certain students would be coming and going for various pull-out programs. Consequently the curriculum had to be chopped into segments and compressed" (p. 712). A year-long observation study in grades K-2 (Achilles, et al., 1995) showed the constant confusion of students moving in and out of classes for "specials." Timing was important. A student might watch a teacher start a lesson, leave mid-lesson, and return at the midpoint of the next lesson, effectively experiencing the beginning of reading and the end of math. Confusing? Yes, especially when the student's coming and going also are distractions for the rest of the class. Other results included more time on task, less misbehavior and greater test-score gains in small classes.

Achilles, C. M., Kiser-Kling, K., Aust, A., & Owen, J. (1995, April). A Study of Reduced Class Size in Primary Grades of a Fully Chapter-1 Eligible School: Success Starts Small (SSS). Paper presented at the American Educational Research Association, San Francisco, ERIC ED 419-288.

Hong, L, K. (2001, May). Too many intrusions on instructional time. Phi Delta Kappan, 82 (9), 712-714.

Ladson-Billings, G., & Gomez, M. L. (2001, May) Just showing up: Supporting early literacy through teachers' professional communities. Phi Delta Kappan, 82 (9), 675-680.

The proliferation of "specials" breaks up the serious continuity of the education process and intrudes upon the work of competent teachers. Running students in and out of the classroom and up and down the hallways may relieve stress and improve physical conditioning, but it detracts from engaged time on task, a major variable in student achievement.

5. Much can be said for teacher's aides, especially for their help in classroom activities that could free the teacher to teach, or in monitoring students, or in other roles. Unfortunately, these scenarios don't seem to be the norm. Haberman (2000, p. 205-206) noted:

> A recent study of Title I (an eight-billion-dollar program focused on disadvantaged students) shows that teacher aides spend 60% of their time actually teaching (41 % of this time without a teacher present). In many cases, aides are teaching in situations that call for the most sophisticated level of professional practice. They are expected to teach students the teacher cannot control or relate to and has kicked out of class or students with learning problems or students who need to be motivated. These very demanding tasks, which require the most knowledge, skill, and experience, are being performed by individuals with little preparation. The more highly trained professional (i.e., the teacher) teaches those without problems or those who will follow directions. If the teacher works on keeping things under control and the aide actually teaches the most challenging students, what does that tell us about the primary purpose of "teaching" in the urban "school"?
>
> Haberman, M. (2000, Nov.) Urban schools: Day camps or custodial centers. Phi Delta Kappan, 82 (3) 203-208.

An analysis of the STAR kindergarten classes found that, proportionately, there were more "special education" students in small classes (13-17 students) than in regular classes with full-time teacher aides (22-25 students). Proportionately, special-education identified students were over-represented in small classes by +5.6% and under-represented in aide classes by –4.1%. [They were under-represented in regular classes (22-25 students) with no full-time aide, too (-1.5%)]. Observation studies (see Haberman's quote above) suggest—at least in the early grades K-2 or so—that when an aide is present a teacher is likely to send a disruptive or troubling student to the aide to "baby-sit." In a classroom without an aide, the teacher must determine work on the problems. Students whose special needs are identified early (K, 1) may get services and, through early remediation, not end up in a spiral of high-cost special services.

6. The continuing cry for "staff development" seems to blame the teacher for whatever might be "wrong" in schooling today. Consider Spark's (1995) suggestion that there is a need for a paradigm shift in staff development. Sparks then continued,

> "While the knowledge, skills and attitudes of individuals must continually be addressed, quality improvement expert W. Edwards Deming estimates that 85% of barriers to improvement reside in the organization's structure and processes, not in the performance of individuals" (p. 3). In Sparks, D. (1995, Winter). A paradigm shift in staff development. Professional staff development: The ERIC Review, 3 (3), 2-4.

If the 85% is true, and if administrators are in charge of the organization, then the blame would seem to shift to those who might make "administratively mutable" accommodations. Scenario: An elementary teacher with 32 students (4 of whom are included LD students) does not use the portfolio process (no time, too much confusion, no space), so the supervisor prescribes "staff development" even though the teacher knows how to use portfolios well. Should anyone be surprised when the teacher is put back in the class of 32 and still does not use portfolios well? How did the staff development take care of the organization elements of time, space, confusion?

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Table 1. Listing of Some Class-Size Studies and Research Summaries, 1970-2001: Thirty (+) years of The "Present Generation"

Author, Study	Source/Date*
Lindbloom	1970
Olson	1971 (From Cavenaugh, 1994)
Glass and Smith	1978, 1979
Smith and Glass	1979
Filby et al.	1980
Glass et al.	1982
Shapson et al	1980
Evertson & Folger	1989
Evertson & Randolph	1989
STAR (Generally)	Word et al. (1990)
Teacher Interviews	Johnston (1990)
Good Teacher Study	Bain et al. (1992)
Robinson	1990 Research Review
Project Success (NC)	1994 (In Achilles et al., 1994)
Success Starts Small	Kiser-Kling (1995), Achilles et al.
Wenglinsky	1997 (ETS)
Participation and Achievement	Finn (1998, 1993), Voelkl
SAGE (Wisconsin)	Molnar (1998, 1999)
California CSR	CSR Consortium (1999)
(STAR-Related)	1999 →
Long-Term Effects (STAR)	Krueger, Bain et al. Finn et al., Nye et al.
Teacher Aides	Finn, Gerber et al. Bain, Boyd-Zaharias, Achilles

* Many of these studies have been review briefly in Achilles (1999) Let's Put Kids First. The work of B. Bloom on tutoring and the "2-Sigma Problem" is foundational.

Table 2. Synopsis of Class-size Findings, from STAR and Various Other Sources*

Finding, Idea, Issue, or Question		Selected Sources of Support
I.	Class-size effect was found in all sites, for all participants, at all times and grades K-3, This includes tutoring and "special" projects.	STAR, Challenge, Reading Recovery (RR), Success for All (SFA)
II.	Small classes work best when students start (K, 1) school in them; they are preventive, not remedial. Formal and small-class education MUST start no later than K, be intense (all day, every day) and last at least 3 years (Duration).	STAR, SSS, Challenge SAGE, Burke Co. Abecedarian (NC). Finn & Achilles (1999)
III.	Crowding, not just small classes, is an issue. School safety and environment are improved. (Prout, 2000). School size is important.	STAR, SSS, Nye, Fowler & Walberg, Behavioral Research, Cotton, others.
IV.	Although all pupils benefit from small (S) classes in K-3, some students benefit more than others.	STAR, SFA, RR, LBS, Other class-size work
V.	The teacher is important. Each pupil's learning depends upon the teacher and others in the class. (Thus the class is the unit of analysis).	STAR, LBS, SSS, Challenge, Burke County, CSR in California.
VI.	A teacher aide does not improve student outcomes. This adds to crowdedness and causes new dynamics (Issues: Training, inclusion, ESL, role description).	STAR, Other Studies. Finn, Gerber et al., (2001); Bain & Boyd-Zaharias (1998)
VII.	Teachers should use known educational-improvement process: (Parent and home involvement, portfolios, alternative assessments, etc.). Small classes may not change what teachers do—just how much they do good things well.	STAR, LBS, SSS, Filby et al., Burke County, NC Downtown School, NC STAR Teacher Studies.
VIII.	Reduce retention in grade especially when student will be moving into another small class. (Retention should not be used, unless in extreme cases).	STAR, Many studies of Retention (Holmes and Matthews).
IX.	Study costs and benefits; Use PTR and class size differences to get to small classes.	STAR, SSS, PTR studies Darling-Hammond; Miles
X.	Small classes and small schools encourage increased student participation in schooling.	Finn, Voelkl, STAR, LBS, Lindsay's work, etc.
XI.	Small classes in early grades provide long-term multiple benefits.	Krueger; STAR Follow-up Finn & Achilles, (1999), Finn et al., (2001)

* Detailed references are available. They were omitted because of space. RR = Reading Recovery; SFA = Success for All; SSS = Success Starts Small.

Table 3. Summary of Small-Class Benefits: Source, Study, (x= Yes, as included in the source named)

STUDY or SOURCE *

Observed In-Class Changes	Lind-bloom 1970	Olson 1971	Glass & Smith 1978	Smith & Glass 1979	Burke Co. 92 - 02	SAGE 2000 +	SSS 1994 1995	FCPS 1997	Cooper 1989	STAR 1985+	Project Success 1994	Teacher "Stories" 2001+	Tot. of 12
A. Increases:												ALL	
• Time on Task		X	X	X	X	X	X	X	X	X	X		11
• Hands-on	X	X		X	X	X	X	X		X	X		10
• Indiv. Attn.	X	X	X	X	X	X	X	X	X	X	X		12
• Diagnosis	X			X	X	X	X	X		X	X		9
• Social Climate	X	X		X	X	X	X		X	X	X		10
• Management	X	X	X	X	X	X	X	X	X	X	X		12
• Participation	X	X	X	X	X	X	X	X		X	X		11
• Academics	X	X	X		X	X	X	X	X	X	X		11
• Parent Involv.					X	X				X	X		5
• Early ID of Spec. Ed.					X					X	X		4
• Morale	X	X		X	X	X	X		X	X	X		10
• Space					X		X			X	X		5
• Enrichment	X	X			X		X	X	X	X	X		9
• Text/Methods	X	X			X	X	X	X	X	X	X		10
• Group Work	X			X	X		X	X		X	X		8
B. Decreases:												ALL	
• Indiscipline	X	X		X	X	X	X		X	X	X		10
• Retention					X					X			3
• Spec. Ed.					X					X	X		4
• Stress		X		X	X	X	X		X	X	X		9

* SSS: Success Starts Small: Achilles et al. (1994); Kiser-Kling (1995). SAGE: Student Achievement Guarantee in Education, Molnar (1998). Project Success from Achilles et al. (1994). FCPS: Fairfax County (1997). STAR (Word et al., 1990). Teacher stories are from CA, NC, SC, TN, and WI. Other authors are listed in References.

Table 8.

A. Positive Benefits of Small Classes Are Supported by Many Well Researched Theories About Teaching, Learning, and Learning Groups.

I. LEARNING

A. Task Induction: Learn About School (The Student's Work).
B. Time On Task.
C. Appropriate Homework
D. Engagement, Participation, Identification.
E. Child Development

II. TEACHING

A. Individual Accommodation.
B. Early Diagnosis And Remediation Of Learning Difficulty.
C. Teach To Mastery.
D. Immediate Reinforcement.
E. Assessment (In-Class)
F. Use Of Effective Teaching Methods.
G. Child Development

III. CLASSROOM

A. Classroom Environment (E.G.: Air Quality, Materials, Space/Crowding).
B. Personal Attention/ Community.
C. Inclusion, Special Needs
D. Group Dynamics.
E. Opportunity For Peer Interaction.
F. Classroom Management.
G. Less Indiscipline.
H. Lower Noise Levels

IV. "OTHER"

A. Increased Parent Interest.
B. Teacher/Student Morale/Energy.
C. Accountability And Responsibility
D. Assessment (Outcome)

B. Small Classes Facilitate Important Class-Level Activities

1. Field Trips, Celebrations and Other Class Events
2. Inclusion Efforts
3. Home-School Communication
4. Cooperative Learning, Portfolios
5. Parent Engagement and Involvement
6. Student-Led Activities
7. Conferencing
8. Learning Centers, Group Projects

Table 9. Checkpoints In Assessing True Costs of Reasonable-Sized (e.g. 18:1 or so) Classes in Primary Grades. (Modified from Achilles & Price, 1999).

Item	Potential for Cost Saving
A. Grade Retention	A. • Number of students held back decreases • Later drop-out rate decreases
B. Improved Student Behavior in School	B. • Vandalism costs decrease • Required corrective actions, such as Saturday school or detention decrease • Classroom disruptions decrease
C. Remediation and Special Projects	C. • Fewer expensive special projects required • Concentrate on fewer students intensely for shorter duration
D. Early ID of Learning Problems	D. • Special education programs reduced in later years • Programs accurately "targeted" to most needy students • Note possibility of increased costs in K and 1 • More effective use of inclusion
E. Teacher Morale	E. • Increased attendance • Reduced substitute costs • Reduced "Burn out"
F. Creative Space Use	F. • Transportation-related costs • Flexibility and "found" space • Partnerships with business
G. Community, Parent Involvement, Volunteers	G. • Small classes attract parents and volunteers • Field trips (etc.) are less congested • Teachers get to know parents well
H. Teacher Aides	H. • Research suggests reducing the number of aides and assigning those remaining to non-class (support) work.

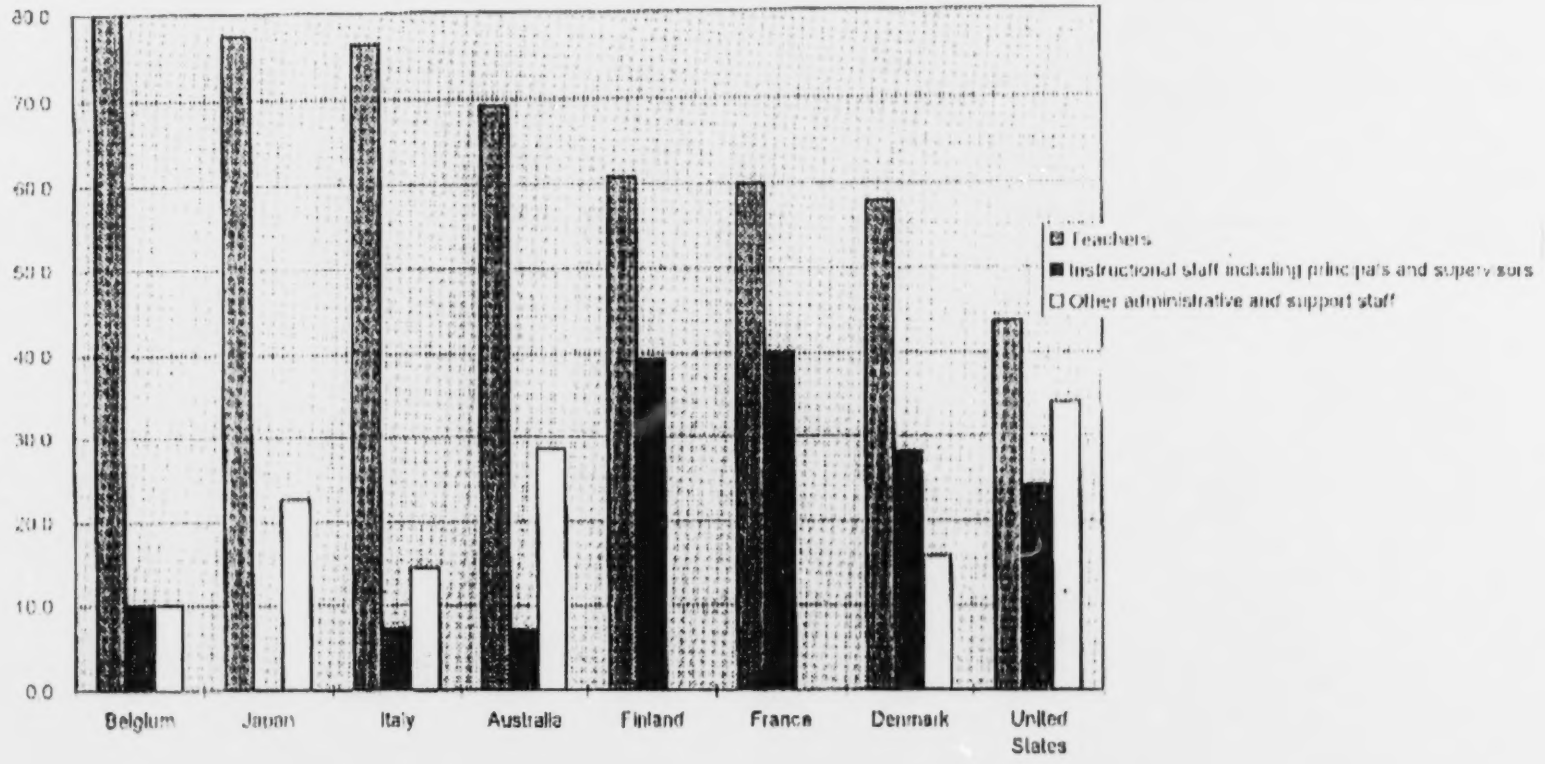

FIGURE 2. *Comparison of educational staff by function (shown in percentages). Source: Organization for Economic Cooperation and Development (OECD),* Education at a Glance: OECD Indicators *(Paris: OECD, 1995), Table p31, 176–77.*

Figure 1 [Figure 2 from Darling-Hammond, L. (1998). p. 11.]

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APPENDIX A

Some Major Differences Between Class Size (CS) or Class-size Reduction (CSR) and Pupil-Teacher Ratio (PTR)

VARIABLES of note in comparing PTR and CS	PUPIL-TEACHER RATIO (PTR)	CLASS SIZE (CS) or (CSR)
Definition	Students (n) at a site (building, district, class) divided by: teachers, educators, adults, (etc.) serving the site.	Students (n) in a teacher's room regularly.
Computation	DIVISION, with various divisors available depending upon the EXACT definition.	ADDITION. This cannot be accurately determined from large databases.
Concept	The teacher needs help; the student needs special services the teacher cannot provide.	A competent teacher can handle most education issues if given a reasonable case load.
Operation and Context	A project and "pull-out"- driven model full of commotion and "Band Aid" treatments. Loss of time on task. Difficulty in determining responsibility and accountability.	Teacher is responsible and accountable for the student's growth and development: Academics, Behavior, Citizenship, Development, (A, B, C, D) Small focused learning groups.
Outcomes	CONSISTENTLY MARGINAL. Note, for example, education "production function" analyses; Title I evaluations, Boozer and Rouse (1995), Borman and D'Agostino (1996) Wong and Meyer (1998), etc.	CONSISTENTLY POSITIVE on many variables (A, B, C, D). See data in Tables 1 & 2 of this paper. Much consensual validation, anecdotal evidence, and "common-sense" support.

CLASS SIZE REDUCTION

A Report of the Ad Hoc Class Size Committee

Prepared for the Board of Trustees
of the Pleasanton Unified School District

October 10, 1995

Class size soon became a regular topic of discussion at trustee meetings. On May 23, 1995, trustees appointed a 26-member Ad Hoc Class Size Committee of parents, teachers and school administrators to study the Issue and make recommendations.

HOW BIG IS BIG?

✓ California has the largest classes of any state in the nation, and Pleasanton has some of the largest classes In California. (Figure 1 and Figure 2). ✓

Figure 1: CLASS SIZE – CALIFORNIA VS. OTHER BIG STATES

State	Pupils enrolled per teacher *	National rank	Percentage above/below average
California	24.1	1	+39%
Michigan	19.2	6	+11%
Florida	18.2	10	+5%
Ohio	17.5	14	+1%
U.S. average	17.3	—	—
Pennsylvania	17.2	19	-1%
Illinois	17.1	20	-1%
Texas	16.2	32	-6%
Massachusetts	14.9	43	-14%
New York	14.5	46	-16%
New Jersey	13.6	49	-21%

NB → * — "Pupils enrolled per teacher" means total enrollment divided by total full-time equivalent teachers. "Teachers" includes regular classroom teachers plus all other certificated personnel. NB ←

Source: Based on *Rankings of the States, 1994*, by the National Education Association, via EdSource of Menlo Park.

The Nevada Class Size Reduction Evaluation Study 1995

Executive Summary

This evaluation report is an analysis of the effects of the Class Size Reduction Act which was passed by the Legislature in 1989. This Act called for a reduction in student to teacher ratios for selected kindergarten classes and for first, second and third grade classes, to be phased in over a period of years. A district average of a 15 to 1 student to teacher ratio was mandated for these grades. At this time the program has been implemented through second grade. This evaluation focuses on second grade students although some data for third and fourth grade students was also used. In general, the range of all actual class sizes has decreased over the years the program has been in effect. This study demonstrates that student to teacher ratios have been successfully reduced since the implementation of the Act and presents the following findings.

Class Size (Emphases Added)

For the purposes of this evaluation a student-teacher ratio of 15 or less to 1 was defined as "small" and a student-teacher ratio of over 15 to 1 was defined as "large". It should be noted that the differences between these two class size classifications are, in reality, very small. There were fewer extremes in actual class sizes in the second grade in 1993 and 1994 than there were in 1992. Another factor is that the smaller ratio classrooms in 1993 and 1994 tended to be team taught rather than self-contained.

- In 1993 smaller second grade classrooms (sic) were associated with higher mathematics scores, but lower reading scores in the rural and Washoe districts. In Clark there were no significant differences in reading or writing scores by size of class.

- In 1994 smaller second grade rural and Washoe classrooms (sic) were associated with lower reading scores but mathematics scores were not affected by classroom size.

Classroom Configuration

The two major types of classroom configurations in the second grade classes were self-contained and team taught. Self-contained means one teacher and students in a classroom; team taught means two teachers and their students in one classroom.

Other recent examples of the PTR and class-size confusion (e.g., just add teachers) and mis-use of the terms include:

- Ehrenberg, R. C., Brewer, D. J., Gamoran, A., & Willms, J. D. (2001, November) Does class size matter? Scientific American 285 (5). 79-85.
- Ehrenberg, R. C., Brewer, D. J., Gamoran, A., & Willms, J. D. (2001, May). Class size and student achievement. Psychological Science in the Public Interest, 2 (1). 1-30.
- Finn, C. E. Jr. (1997, October 29) The real teacher crisis. Education Week, 48, 36.
- Hanushek, E. (2000, October). Evidence, politics, and the class-size debate. Washington, DC: Economics Policy Institute. Working Paper #121.
- Hanushek, E. A. (1999, Summer). Some findings from an independent investigation of the Tennessee STAR experiment and from other investigations of class size effects. (sic). Educational Evaluation and Policy Analysis, 21 (2), 143-163.
- Hanushek, E. A. (1998, February) The Evidence on Class Size. Rochester, NY: The University of Rochester. W. Allen Wallis Institute.
- Hruz, T. (2000, September). The costs and benefits of smaller classes in Wisconsin. Thienville, WI: The Wisconsin Policy Research institute, Inc.
- Hruz, T. (1998, Fall/Winter). Beyond smoke and mirrors. A critical look at smaller class sizes. Wisconsin Interest, 29-37.
- Laine, S. W. M. & Ward, J. G. (eds) (2000). Using What We Know. A review of the research on implementing class-size reduction initiatives for state and local policymakers. Oak Brook, IL: NCREL (Esp. Chapters 1-4 and 6).
- Shakeshaft, C., Mann, D., Becker, J. & Sweeney, K. (2002, January). Choosing the right technology. The School Administrator, 59 (1), 34-37. (Esp. p. 36.)
- Several policy papers from The Heritage Foundation, e.g.:

  Johnson, K. A. (6/9/00). Do Small Classes Influence Academic Achievement? What the National Assessment of Educational Progress Shows.

  Shokraii Rees, N. H. (9/24/99). How Congress Can Assure Title I Dollars Benefit Poor Students.

  Shokraii Rees, N. H. (5/28/99). Accountability 101: Why the President's Educational Proposals Won't Make the Grade.

  Shokraii Rees, N. H. (4/13/99). A Close Look at Title I, The Federal Program to Aid Poor Children.

ECTION B CALIFORNIA

Los Angeles Times

Crowded O.C. Schools Seek Bond Relief

Education: Seven districts seek voters' OK for $731.6 million to build and repair learning sites. Proposition 39's smaller-majority election rule bolsters hopes.

By JERRY HICKS
TIMES STAFF WRITER

Teachers and parents in the Anaheim City School District would love to end the staggered scheduling that has many students arriving in shifts and shuffling between classes to make limited seating work for everyone.

That's one reason the district is seeking a $111-million bond measure, despite the fact a similar effort failed a few years ago with a 55% yes vote. Another reason: A change in election rules means that same percentage now would be a winning majority.

Until now, school bonds required a two-thirds majority from the voters. But Proposition 39, passed by voters in 2000, reduced that to 55%.

In fact, the new rule has prompted seven Orange County districts to place bond measures, totaling $731.6 million, on the March 5 ballot.

Bonds will be sought by three elementary school districts, two high school districts, a unified school district and the North Orange Community College District, which includes Fullerton and Cypress colleges.

If all the bond measures pass, that would mean more than $1 billion new dollars for school construction and repair work, since all the districts would qualify for some matching state money.

"We're confident the public wants good schools, and our kids deserve it," said Gary Rutherford, superintendent of the Huntington Beach City School District.

Last summer, a $30-million bond for Rutherford's schools failed with just 62% approval. Now the district is retooling its proposal and will try again in March.

Part of the seven districts' bond money would go for new facilities to house growing enrollment. But for many older schools, long delayed repairs are in order.

"We've got classrooms with just one electrical outlet," Rutherford said. "That won't accommodate today's teaching methods, where you need plenty of places to plug in computers."

In some parts of the county, though, the number of school bond measures could make voters balk. Some voters in Fullerton and Anaheim will face several different bond issues on the same ballot.

The bond in Huntington Beach would cost voters $16 annually for each $100,000 assessed property valuation. But in Anaheim, voters are being asked to support three bonds for a total of $85.70 above their current tax for every $100,000 assessed valuation—for the city schools, the high school district and the North Orange County Community College District. Fullerton residents, also in the North Orange County Community College District, must also vote on three bonds, for a $68.25

Please see SCHOOLS, B7

Photos by GERALDINE WILKINS / Los Angeles Times

Second-graders at Sunkist Elementary in the Anaheim City School District take chairs back to classroom after outdoor assembly. There is no indoor assembly site.

Wendy Olsen, left, teaches 40 students from two classes at Anaheim's Sunkist Elementary, while Aviva Pollack, right rear, with whom Olsen shares the classroom, works with two students.

'Our students are trying to compete with school systems which already have advanced technology. We must make major changes in our classrooms—get our students out of those portables—if we're going to keep up.'

Supt. Jan Billings
Anaheim Union
High School District

A-5

PTR

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Appendix B

A Longitudinal Class-Size Experiment.

Project STAR (1985-1989) and the many studies that build upon STAR (See Table 1 for a partial listing) benefit from the experiment's tightly controlled, in-school longitudinal design. STAR was conducted by a four-university consortium with considerable external support from consultants, advisory groups, and the Tennessee State Department of Education. Basic design issues are:

(1) Project STAR built on principles recognized in prior research. The intervention began in the primary grades. Small classes had fewer than 20 students. STAR's design enabled researchers to look at the effects on minority as well as majority students. Moreover, the design required a "real" difference in the class sizes, from an average of 24 pupils to an average of 15.

(2) STAR was a controlled experiment that permitted, to the extent possible with empirical data, causal conclusions about outcomes. Pupils entering K were randomly assigned to a small class (S; 13-17), a regular class (R; 22-27), or a regular class with a full-time teacher aide (RA). Pupils entering in later years were also assigned at random to classes. Teachers were assigned to classrooms at random. Randomization was monitored carefully.

(3) With minor exceptions, students were kept in their class grouping in grades K, 1, 2, and 3. A new grade-appropriate teacher was assigned to the class each year. STAR was a four-year longitudinal experiment.

(4) Norm-referenced tests (NRT), and criterion-referenced tests (CRT) and measures of self concept and motivation were administered each spring. Researchers used a post-test only design. (Campbell and Stanley, 1963).

(5) The samples were large and diverse. The K year involved over 6300 students in 329 classrooms in 79 schools in 46 districts. The first-grade sample was larger still. The large samples were maintained throughout the four years, producing an excellent longitudinal database. Total sample = 11,601.

(6) The class arrangement was maintained throughout the day, all year long. There was no intervention other than class size and teacher aides. No special training was provided to the teachers except for a small sample in second grade; no special curricula or materials were introduced. (Training didn't increase outcomes).

(7) Students were followed and evaluated after STAR ended in grade 3. Most students graduated in 1998. Their college-entrance test results were monitored. (Krueger & Whitmore, 1999).